

## Pinching Pages

**What you'll need:** a millimeter ruler, your textbook

How thick is a single page of your textbook? One page alone is too thin to give an accurate answer if you measure directly with a ruler, but you could measure the thickness of 100 pages together, then divide. This method would give you an estimate of the thickness but no information about the precision of your measurement. This activity lets you judge precision as well as thickness.

- in a new Fathom document, pull down a **Table**
  - click in the **New** box and title it "Pages"
  - press **Enter**.
  - click in the **New** box and title it "Thickness – mm"
  - pinch together the front cover and the first 50 pages (the first 50 *sheets* of paper, not up to page 50!) of your book
  - measure the thickness to the nearest millimeter and record these data in the table
  - repeat this step for the cover plus 75, 100, 125, 175, 230, 290, 365 pages, and the entire book
  - pull down a **Graph** and drop the **Pages** on the explanatory axis and the **Thickness** on the response axis
1. Does the plot look linear? Should it? Discuss why/why not and take the measurements again, if needed.
    - place a movable line on the scatterplot by choosing **Movable Line** from the **Graph** menu (across the top)
    - adjust the line to best fit the points by dragging the line
    - the equation of the line shows below the graph and changes as you adjust the line
  2. After adjusting the line, what are the line's slope and y-intercept (from the equation)? What does the y-intercept tell you? What does the slope tell you?
  3. What is your estimate of the thickness of one page?
  4. How would your line have changed if you hadn't included the front cover?

5. Describe the data. Be sure to mention trend, strength, variability, patterns, and unusual points.

- have Fathom calculate the correlation of the data...
- pull down a **Summary** box
- grab the explanatory variable and drop it below the "Drop an attribute here" box
- grab the response variable and drop it to the right of where the "Drop an attribute here" box was
- there should now be a number in the cell where this row and column intersect; this is the correlation of the data

6. Comment on this correlation.

## Was Leonardo Correct?

**What you'll need:** a meterstick or measuring tape

Leonardo da Vinci was a scientist and an artist who combined these skills to draft extensive instructions for other artists on how to proportion the human body in painting and sculpture.

Three of Leonardo's rules were

- ✓ height is equal to the span of outstretched arms
- ✓ kneeling height is three-fourths of standing height
- ✓ the length of the hand is one-ninth of the height

- open the Fathom document **Leonardo**
- work with your partner to measure each other's data (in centimeters) and add these numbers to the chart
- get the data from three other people in class so that you have a total of 20 data items

7. Check Leonardo's three rules visually by plotting the data in question on a scatterplot, one pair at a time. Describe what you find.

- add a **Movable Line** if you believe this helps answer the question
- find the correlation of each pair of data that you make into a scatterplot

8. Of the six total possible displays, which has the strongest positive trend? Do any of them have no trend? Which has the weakest amount of strength? Are there any which are fanned to the right or left? Which have a linear pattern? Which have a curved pattern? Are there any outliers present in any of the displays?